WHAT IS CLAIMED IS:

1. A method of increasing the efficiency of transformation of cycling cells, comprising:

synchronizing cells at a first stage of the cell cycle by contacting said cells with electromagnetic radiation, and

transforming said cells at a second stage of the cell cycle within about one cell cycle of said first stage with a nucleic acid that encodes a desired gene product.

2. A method of claim 1 wherein said electromagnetic radiation synchronizes cells at a stage of the cell cycle when the nuclear membrane is substantially degraded.

3. A method of claim 1 wherein said electromagnetic radiation synchronizes cells at late S phase.

4. A method of claim 1 wherein said electromagnetic radiation synchronizes cells at the G_2/M phase boundary.

5. A method of claim 1 wherein said electromagnetic radiation synchronizes cells at a stage other than M phase, and the nucleic acid accumulates in cells that have cycled to the G_2/M phase boundary.

6. A method of claim 1 wherein said first stage and said second stage are the same.

7. A method of claim 1 wherein said therapeutic gene is foreign to said cells.

8. A method of claim 1 wherein said gene product of said therapeutic gene is toxic to said cells.

9. A method of claim 8 wherein said gene product of the therapeutic gene induces apoptosis.

10. A method of claim 1 wherein said nucleic acid is part of a lipid-nucleic acid particle.

11. The method of claim 1 wherein said electromagnetic radiation is a member selected from the group consisting of Gamma rays, X-rays, ultraviolet rays, infrared rays and microwaves.

12. The method of claim 11 wherein said electromagnetic radiation is X-rays.

13. A method of inhibiting the growth of cancer cells, comprising:

exposing a cancer patient to an amount of electromagnetic radiation that is effective to synchronize cancer cells of said patient at a first stage of the cell cycle; and

administering to said cancer patient a nucleic acid that transforms cancer cells of said patient;

wherein the expression of said nucleic acid inhibits the growth of said cancer cells.

14. The method of claim 13 wherein said cancer cells are synchronized at a stage when the nuclear membrane is substantially degraded.

15. The method of claim 13 wherein said electromagnetic radiation synchronizes the cell cycle at late S phase.

16. The method of claim 13 wherein said electromagnetic radiation synchronizes the cell cycle at the G_2/M interphase.

17. The method of claim 13 wherein said electromagnetic radiation synchronizes the cell cycle at a stage other than M phase, and the nucleic acid accumulates in cells when a plurality of cells exposed to the agent have cycled to the G_2/M interphase.

18. A method of claim 13 wherein said first stage and said second stage are the same stage of the cell cycle.

19. A method of claim 13 wherein said nucleic acid encodes a therapeutic gene.

20. A method of claim 19 wherein said therapeutic gene is foreign to said patient.

21. A method of claim 20 wherein said gene product of said therapeutic gene is toxic to said cancer cells.

22. A method of claim 21 wherein said gene product of said therapeutic gene induces apoptosis of said cancer cells.

23. A method of claim 13 wherein said nucleic acid is part of a lipid-nucleic acid particle.

24. A method of claim 13 wherein said nucleic acid is administered systemically.

25. A method of claim 13 wherein said therapeutic gene is expressed in said cancer cells.

26. A method of claim 25 wherein said therapeutic gene is HSV-TK and ganciclovir is also administered to said cancer patient

27. The method of claim 13 wherein said electromagnetic radiation is selected from the group consisting of Gamma rays, X-rays, ultraviolet rays, infrared rays and microwaves.

28. The method of claim 17 wherein said electromagnetic radiation is X-rays.

29. The method of claim 13 wherein said patient is exposed to said electromagnetic radiation prior to administering said nucleic acid.

30. The method of claim 29 wherein said patient is exposed to said electromagnetic radiation at least 32 h prior to administering said nucleic acid.

31. The method of claim 29 wherein said patient is exposed to said electromagnetic radiation at least 48 h prior to administering said nucleic acid.

32. The method of claim 13 wherein said nucleic acid is administered to said patient prior to exposing said patient to said electromagnetic radiation.

33. The method of claim 32 wherein said nucleic acid is administered to said patient at least 32 h prior to exposing said patient to said electromagnetic radiation.

34. The method of claim 32 wherein said nucleic acid is administered to said patient at least 48 h prior to exposing said patient to said electromagnetic radiation.

35. A method of enhancing the therapeutic effect of a foreign therapeutic gene administered to a patient, comprising the steps of

(a) exposing said patient to an amount of electromagnetic radiation that is effective to synchronize the cells of said patient at a first stage of the cell cycle; and

(b) administering said foreign therapeutic gene to said patient within seven days of step (a).

36. The method of claim 35 wherein step (b) is performed within 3 days of step (a)

37. The method of claim 35 wherein step (b) is performed within 24 hours of step (a).

38. The method of claim 35 wherein said foreign therapeutic gene is a plasmid.

39. The method of claim 35 wherein said foreign therapeutic gene comprises a gene selected from the group consisting of genes encoding a cytokine, apoptotic protein, tumor suppressor, heat shock protein, immunogenic antigen, proteinase inhibitor, anti-angiogenic protein, suicide gene for use in GDEPT, ribozyme, antisense nucleic acid, viral protein and a toxin.

40. The method of claim 35 wherein said foreign therapeutic gene is administered systemically.

41. The method of claim 35 wherein said foreign therapeutic gene is administered locally or regionally.

42. The method of claim 35 wherein said foreign therapeutic gene is administered locally or regionally.

43. The method of claim 35 wherein said foreign therapeutic gene is fully encapsulated in a lipid formulation such that less than 5% of the gene is degraded after exposure of the formulation to 1 U DNAse I for 30 minutes in digestion buffer at 37°C.

44. The method of claim 35 wherein said electromagnetic radiation is selected from the group consisting of Gamma rays, X-rays, ultraviolet rays, infrared rays and microwaves.

45. The method of claim 38 wherein said electromagnetic radiation is X-rays.